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09/817,330REMARKS

Claims 19-37 remain in the application. Claims 1-18 were canceled previously. By this amendment, claims 24-27, 29, 33 and 34 have been amended, and new claim 38 has been added. The specification at paragraph [0015] supports the amendment to claim 26, and paragraph [0016] supports the amendments to claims 27 and 33. Paragraph [0012] supports the amendments to claims 34 and 37, and the addition of claim 38.

Applicants note that the Examiner's re-opening of prosecution on this application occurred prior to a decision on the merits by the Board of Patent Appeals, and that per MPEP §1208.02, applicants' fees paid for the Notice of Appeal on February 25, 2004 and the Appeal Brief filed on April 26, 2004 will be applied to a later appeal on this application if such an appeal is necessary.

Objection to Drawings

The Office Action notes under Item 10 of the Summary page that the drawings filed on 26 March 2001 are objected to by the Examiner. However, applicants submitted Formal Drawings for this application on February 3, 2004. Applicants received a return postcard date stamped February 6, 2004 from the PTO regarding the submittal of Formal Drawings. Applicants have attached a copy of the postcard as Appendix A. Applicants respectfully request that Examiner Phan please verify the receipt of the formal drawings, or clarify the objection.

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Claims 19-24, 28, and 31-37 are rejected under 35 U.S.C. §102(e) as being anticipated by Yano et al, USP 6,046,499 (hereinafter Yano). This rejection is respectfully traversed in view of the amendments made herein and the remarks presented hereinafter.

Claim 19 calls for a method of making an integrated circuit, comprising the step of plating a conductive material to project outwardly from a second surface of a substrate to form a lead-free first lead of the integrated circuit.

Applicants respectfully submit that Yano fails to anticipate claim 19 because Yano does not show a step of plating a conductive material outwardly from a second surface of a substrate. Yano only teaches the use of individual spherical balls that are placed onto a package substrate.

Specifically, at column 3, lines 8-9 Yano states that the electrical connection member according to his invention is a "spherical ball which is made of a low-melting alloy." Yano additionally states at column 4, lines 35-36 that the bumps 27 are made of "solder balls arranged at a peripheral portion 25a of a lower surface 25." Further, in column 8, lines 11-13, Yano teaches that "[b]umps 27 and heat transfer members 29 are connected to a printed board 15 to obtain semiconductor device 33." Moreover, in column 5, lines 50-55, Yano teaches that the heat transfer members may comprise a different material than that of bumps 27, which clearly shows that Yano is teaching only the conventional placement of solder balls. Nowhere does Yano teach plating a

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conductive material to project outwardly from a second surface of a substrate.

In response to the Examiner's reference to Yano column 7, lines 24-32, applicants respectfully submit that Yano is only describing a process of making individual spherical balls, which are then later placed onto a substrate as described in Yano's column 4. Applicants' position is further supported by lines 27-31 of Column 7 where Yano teaches a bump having resin core with conductive peripheral layer. Such an approach is clearly teaching the formation of separate balls that are later attached to the printed circuit board.

Since Yano fails to teach the plating of a conductive material to project from a second surface of a substrate, applicants submit that Yano fails to anticipate claim 19.

Claim 20 depends from claim 19 and is believed allowable over Yano for at least the same reasons as claim 19.

Claim 21 depends from claim 20, and further calls for the step of forming a signal path on the first surface with the conductive material. Claim 21 is believed allowable over Yano for the same reasons as claim 19. Additionally, applicants respectfully assert that claim 21 is allowable over Yano because Yano does not teach that the first lead and signal path comprise the same the material (see Yano column 7, lines 4-14).

Claim 22 depends from claim 21, and further calls for the step of disposing the conductive material in a via defined by the substrate to extend the signal path from the first surface to the second surface of the substrate. Claim 22 is believed allowable for the same reasons as claims 19-21. Additionally, applicants respectfully assert that claim

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22 is allowable over Yano because Yano does not teach disposing the conductive material in the via as is called for in claim 22.

Claim 23 depends from claim 22, and further calls for the step of disposing the conductive material on the second surface to extend the signal path from the via to the lead-free first lead. Claim 23 is believed allowable for the same reasons as claims 19-22. Additionally, applicants respectfully assert that claim 23 is allowable over Yano because Yano does not teach disposing the conductive material on the second surface to extend the signal path from the via to the lead-free first lead.

Claim 24 depends from claim 19 and further calls for the step of forming an access pad on the second surface, wherein the access pad comprises the conductive material, and wherein the step of plating the conductive material includes plating the conductive material onto the access pad. Claim 24 is believed allowable for the same reasons as claim 19. Additionally, applicants respectfully assert that claim 24 is allowable over Yano because Yano does not teach forming an access pad on the second surface, wherein the access pad comprises the conductive material, and wherein the step of plating the conductive material includes plating the conductive material onto the access pad.

Claims 28 and 31 depend from claim 19 and are believed allowable for at least the same reasons as claim 19.

New claim 38 depends from claim 19 and further calls for plating the conductive material to project outwardly a distance from the second surface between about 50 microns to about 125 microns. Claim 38 is believed allowable for the same reasons as claim 19. Additionally, applicants respectfully assert that claim 38 is allowable over Yano

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because Yano does not teach plating a conductive material to project a distance from the second surface between about 50 microns and about 125 microns.

Claim 32 calls for a method of forming an integrated circuit, comprising the steps of providing a substrate having a first surface for mounting a semiconductor die, and plating a conductive material to extend outwardly from a second surface of the substrate to form a lead-free lead of the integrated circuit.

For the reasons stated above in applicants' response to the rejection of claim 19, Yano fails to anticipate claim 32 because Yano fails to show plating a conductive material to extend outwardly from a second surface of the substrate.

Claim 33 depends from claim 32 and further calls for the plating step to include plating copper to form the lead free lead. Claim 33 is believed to allowable for the same reasons as claim 32. Additionally, applicants respectfully assert that claim 33 is allowable over Yano because Yano does not teach plating copper.

Claim 34 depends from claim 33 and further calls for the step of plating copper to include plating copper to form the lead-free lead, wherein the lead-free lead extends outwardly from the second surface a distance between about 50 microns and about 125 microns. Claim 34 is believe allowable for the same reasons as claims 32-33. Additionally, applicants respectfully assert that claim 34 is allowable over Yano because Yano does not show plating copper to form a lead-free lead that extends outwardly from the second surface a distance between about 50 microns and about 125 microns.

Claim 35 depends from claim 33 and is believed allowable for at least the same reasons as claims 32 and 33.

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Claim 36 calls for a method of making an integrated circuit, comprising the steps of mounting a semiconductor die to a first surface of a substrate, disposing a conductive material along the first surface and through a via of the substrate to form a signal path of the integrated circuit between the first and a second surface of the substrate, and plating the conductive material on the second surface to form a lead-free lead of the integrated circuit that is electrically coupled to the signal path.

For the reasons stated above in applicants' response to the rejection of claim 19, Yano fails to anticipate claim 36 because Yano fails to show plating a conductive material on the second surface to form a lead-free lead of the integrated circuit that is electrically coupled to the signal path.

Claim 37 depends from claim 36 and further calls for plating the conductive material to project outwardly from the second surface a distance between about 50 microns and about 125 microns. Claim 37 is believed allowable for the same reasons as claim 36. Additionally, applicants respectfully assert that claim 37 is allowable over Yano because Yano does not teach plating a conductive material to project outwardly from the second surface a distance between about 50 microns and about 125 microns.

Response to 35 U.S.C. §103 Rejections

Claims 25-27, 29 and 30 are rejected under 35 U.S.C. §103(a) as being unpatentable over Yano. This rejection is respectfully traversed in view of the amendments made herein and remarks presented hereinafter.

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Claim 25 depends from claim 24 and further calls for the steps of disposing a photoresist layer on the second surface, patterning the photoresist layer to expose the access pad, and plating the conductive material on the access pad. Claim 25 is believed allowable for the same reasons as claim 19 because Yano does not show or suggest plating a conductive material to project outwardly from a second surface of the substrate. As stated above, Yano teaches the placement of conventional BGA solder balls. Additionally, claim 25 is believed allowable for the same reasons as claim 24 because Yano does not show or suggest forming an access pad where the access pad and the plated lead-free lead are the same material.

Claim 26 depends from claim 25 and further calls for the step of disposing the photoresist layer to include disposing a photoresist layer having a thickness determined by a desired height of the lead-free first lead. Applicants believe that claim 26 is allowable for the same reasons as claims 19, 24, and 25. Additionally, applicants respectfully assert that claim 26 is allowable because Yano does not show or suggest disposing a photoresist layer having a thickness determined by a desired height of the lead-free first lead.

Claim 27 depends from claim 19 and further calls for the step of plating to include the step of plating copper. Applicants believe that claim 27 is allowable for the same reasons as claim 19. Additionally, applicants respectfully assert that claim 27 is allowable over Yano because Yano does not show or suggest plating copper to form the lead-free first lead.

Claim 29 depends from claim 19 and further calls for the step of forming a solder mask on the second surface

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between the lead-free first lead and a lead-free second lead of the integrated circuit. Claim 29 is believed allowable for at least the same reasons as claim 19 because Yano does not show or suggest plating a conductive material to project outwardly from a second surface of the substrate. As stated above, Yano teaches the placement of conventional BGA solder balls. Additionally, applicants respectfully assert that claim 29 is allowable over Yano because Yano does not show or suggest an additional step of forming a solder mask on the second surface between the lead-free first lead and a lead-free second lead as is called for in claim 29.

Claim 30 depends from the claim 29, and further calls for the step of forming to include forming the solder mask after the step of plating. Claim 30 is believed allowable for the same reasons as claims 29 and 19. Additionally, applicants respectfully assert that claim 30 is allowable over Yano because Yano does not show or suggest forming the solder mask after the step of plating.



ONS00149  
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In view of all of the above, it is believed that the claims are allowable, and the case is in condition for allowance, which action is earnestly solicited.

Applicants believe that no additional fee for new claim 38 is due because the number of claims is still within the scope of the original filing fee. However, the Commissioner is hereby authorized to charge Deposit Account 501086 for any fees due if deemed necessary.

Respectfully submitted,

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